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Extending Primitive Spatial Data Models to Include Semantics

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Our traditional geospatial data model involves associating some measurable quality, such as temperature, or observable feature, such as a tree, with a point or region in space and time. When capturing data we implicitly subscribe to some kind of conceptualisation. If we can make this explicit in an ontology and associate it with the captured data, we can leverage formal semantics to reason with the concepts represented in our spatial data sets. To do so, we extend our fundamental representation of geospatial data in a data model by including a URI in our basic data model that links it to our ontology defining our conceptualisation, We thus extend Goodchild et al's geo-atom [1] with the addition of a URI: (x, Z, z(x), URI) . This provides us with pixel or feature level knowledge and the ability to create layers of data from a set of pixels or features that might be drawn from a database based on their semantics. Using open source tools, we present a prototype that involves simple reasoning as a proof of concept.

References

[1] M.F. Goodchild, M. Yuan, and T.J. Cova. Towards a general theory of geographic representation in gis. International Journal of Geographical Information Science, 21(3):239–260, 2007.